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Ethiopia's vision for a climate resilient green economy

Contents

6 context

13 climate resilience

21 green economy

40 making it happen

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Ethiopia's vision for a climate resilient green economy

foreword

Ethiopia did not cause climate change, but we are confronted by the threat that it poses, and should recognise the opportunity that it presents. Climate change is not a future possibility for Ethiopia, it is a present reality. That is why it is imperative that we start now to protect our people and our environment, while at the same time building a green economy that will help to realise the ambitions set out in the Growth and Transformation Plan.

This is a challenge for all Ethiopians. The government will lead our response, but we all have a part to play. Our task will be to empower all Ethiopians to prepare for climate change. We will help citizens build their resilience to climate shocks. And we will help citizens make their contribution to Ethiopia's new green economy. By working together, we can ensure that Ethiopia's progress over the past decades is safeguarded for the future.

The Environmental Protection Authority (EPA) has been mandated to co-ordinate our national response to climate change. Through Ethiopia's Programme of Adaptation to Climate Change (EPACC) and emissions abatement initiatives including the Nationally Appropriate Mitigation Actions (NAMAs) our country has made a strong start. The next step is to broaden and deepen this response. Every other sectoral agency, ministry and regional government will have a role to play in marshalling a coherent response to climate change.

This vision is just the first step in a journey. We will need to put in place the right institutions, systems and plans to take forward the ambition outlined in this paper. However, through a shared effort by all Ethiopians, we are confident that we can build a climate resilient green economy.

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5 summary

This is a vision for Ethiopia's ambition to build a climate resilient green economy (CRGE) by 2025. Achieving a CRGE will not be easy. It will require a co-ordinated and sustained effort by all parts of the Ethiopian society – the government, civil society, academia and, most importantly, the public. This document sets out in broad terms what the implications of climate change are for Ethiopia. The CRGE Vision aims to provide Ethiopia with a common goal and roadmap for achieving a climate resilient green economy.

Building climate resilience

Building climate resilience is a huge and urgent challenge for the country. Ethiopia's weather is likely to become more unpredictable in the coming years, with increased flooding and drought. This will impact on all aspects of Ethiopia's economy, and particularly on the health, transport, agriculture, natural resources, energy and industry sectors.

To help respond to this challenge, we have developed Ethiopia's Programme of Adaptation to Climate Change (EPACC). A grassroots initiative, EPACC will help to put in place the local building blocks of adaptation. This initiative will be reinforced by action at the federal, regional and local levels. Climate action plans will identify opportunities for mainstreaming climate change into sectoral and regional development strategies.

Building a green economy

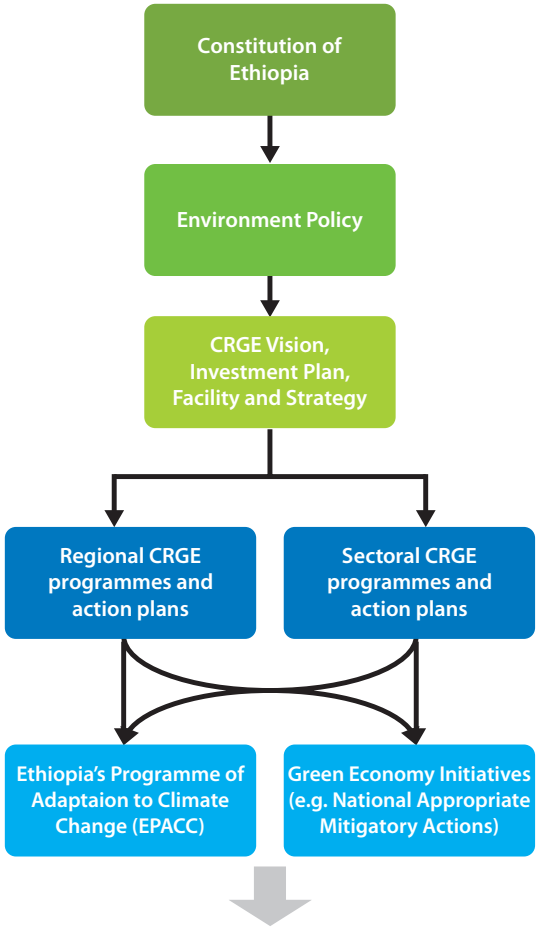
While building its resilience, Ethiopia will also take steps to ensure that its economy is green and sustainable. To do this, we will seize the opportunities presented by low carbon technologies and invest in green industries. Evidence shows that Ethiopia's agriculture, forestry, energy, industry and transport sectors are ripe for low carbon development. By making the right investments, Ethiopia will position itself to be competitive in a carbon-constrained global economy. Through initiatives like the Nationally Appropriate Mitigation Actions (NAMAs), we have identified some immediate priorities for international climate finance for low carbon development. The aforementioned climate action plans will be an opportunity to build on emissions abatement initiatives and mainstream green growth into Ethiopia's regional and sectoral development plans.

A climate resilient green economy is a long-term ambition. This vision sets out three complementing actions needed to move towards this ambition. We have thus identified the need for more work on Ethiopia's climate change institutions, monitoring and finance systems, and sectoral and regional action plans. When combined, these capacities will enable the Environmental Protection Authority to draft a comprehensive CRGE Strategy – which will identify a clear path to the goal of a climate resilient green economy.

context

"climate change must not be considered a narrow sectoral issue"

Purpose



Ethiopia achieves a **climate resilient green economy** bu 2025

This document sets out the challenges and opportunities which climate change brings for Ethiopia. It makes the case for why a carbon neutral and climate resilient development trajectory to a green economy is a priority for the country and thus for the implementation of the current Growth and Transformation Plan. It explains what the Environmental Protection Authority is doing on behalf of the Federal Democratic Republic of Ethiopia to lead and coordinate an efficient and effective national response to climate change.

The pillars of Ethiopia's response to climate change are illustrated on the left. The pillars are Ethiopia's Programme of Adaptation to Climate Change (EPA-CC), and the emissions abatement initiatives (e.g. NAMAs), supported by the CRGE Strategy, National Environmental Policy and the Constitution. Climate Resilient Green Economy (CRGE) sectoral and regional programmes and action plans will build from these to implement the CRGE Strategy and the Growth and Transformation Plan.

The steps required to transform Ethiopia's economy into one which is carbon neutral and climate resilient are described, and the roles and responsibilities of stakeholders from within and outside government are clarified.

Through this vision, the Environmental Protection Authority aims to bring increased collaboration and communication for coherence among the many interested parties working on or affected by climate change in Ethiopia. In particular it aims to ensure that external support is focused and efficient and that new activities and investment are focused on Ethiopia's priorities.

Ethiopia's climate

To set the context, here we set out the scientific consensus of how Ethiopia's climate has changed in the past and of how it is projected to change over the next 20, 40 and 80 years. This current understanding of Ethiopia's changing climate is summarised in the table on page 6, and is drawn from the results of two recent studies which synthesize the results of multiple General Circulation Models (GCMs)[1,2].

1 Conway, D and Schipper, EL, 2010. Adaptation to climate change in Africa: Challenges and Opportunities identified from Ethiopia, Global Environmental Change

2 McSweeney, New and Lizcano, 2008. UNDP Climate Change Country Profiles, Ethiopia. UNDP, School of Geography and Environment, University of Oxford and Tyndall Centre for Climate Change Research. http://country-profiles.geog.ox.ac.uk

Like much of Africa, Ethiopia has become warmer over the past century and human induced climate change will bring further warming over the next century at unprecedented rates. Climate models suggest that Ethiopia will see further warming in all seasons of between 0.7°C and 2.3°C by the 2020's and of between 1.4°C and 2.9°C by the 2050s. It is likely that this warming will be associated with heat waves and higher evapo-transpiration.

Although most models show a tendency for higher mean annual rainfall and for wetter conditions in particular during October, November and December, there is much uncertainty about the future distribution, timing and intensity of rainfall. More regular heavy rainfall events are expected and this is likely to result in increased flooding. However, changes in the severity and frequency of drought and flood events are difficult to project, because these events are influenced by the El Nino Southern Oscillation and sea surface temperatures in the Indian Ocean, and are difficult to model with any degree of confidence.

Uncertainty about the exact nature of future climate change must not be interpreted as uncertainty in the need to act now to minimize future damage.

Ethiopia's institutions

Climate change is of critical strategic importance to Ethiopia. It has the potential to hold back economic progress, or reverse the gains made in Ethiopia's development and could exacerbate social and economic problems. Climate change also has the potential to destabilize the Horn of Africa and bring more fierce competition for water and other resources throughout the Nile Basin. At the same time, climate change and the international response bring opportunities for Ethiopia. Because it may bring more rather than less rainfall, a changed climate may bring benefits for agricultural and livestock production or it may enable higher value crops to be grown, or more hydro-electric power to be generated. In addition, new financial support from industrialized countries for low carbon and climate resilient development, such as for Reducing Emissions from Deforestation and forest Degradation (REDD), are likely to become available. There is enormous potential for action on climate change to deliver multiple co-benefits for the well-being of the population and the country's economy. Ethiopia can, therefore, benefit from charting a low carbon development path in an increasingly 'carbon constrained' world.

In order to minimize the impacts and maximize the opportunities posed by climate change, Ethiopia must plan and implement appropriate actions. These far reaching implications of climate change require a robust and well coordinated response. The Environmental Protection Authority must provide the leadership needed to respond to this challenge.

Through the leadership of the Prime Minister, Ethiopia is taking a leading role in both the regional and global response to climate change. Through effective coordination of the domestic response, the Environmental Protection Authority (EPA), aims to help Ethiopia achieve the ambitious objective of a Climate Resilient Green Economy by 2025.

	Temperature	Rainfall	Extreme Events
Historical trend	Mean temperature increased by 1.3°C from 1960 to 2006. More hot days and nights fewer cold days and nights	Highly variable from year to year, season to season, decade to decade. No significant trend.	Regular sever flood and drought events. No evidence of changes in frequency or intensity of extremes
2020s	+1.2°C (0.7 - 2.3°C)	+0.4% increase in rainfall	Greater increases in rainfall in October to December, especially in the south and east
2050s	+2.2°C (1.4 - 2.9°C)	+1.1% increase in rainfall	Heavier rainfall events, uncertain future El Nino behaviours brings large uncertainties.
2090s	+3.3°C (1.5 - 5.1°C)	Wetter Conditions	Flood and drought events likely to increase, heat waves and higher evaporation

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"Uncertainty about the exact nature of future climate change must not be interpreted as uncertainty in the need to act now to minimize future damage"

The policy and legal context for this vision and the EPA's role as Ethiopia's lead agency on climate change are drawn from the National Environmental Policy and the Environmental Protection Organs Establishment Proclamation No. 295/2002. The relevant provisions with regard to the climate change response within the Environmental Policy, and the statutory mandate and powers to coordinate the national response to climate change in the founding articles of the EPA are set out in the table opposite.

Although the environmental policy and laws set out the basis for dealing with climate change, it is essential to recognize that the implications of climate change and the steps required for an effective response go well beyond environmental management. Climate change must not be considered as a narrow sectoral issue. Instead a cross-sectoral response is needed, involving the whole of the government. The response will require cooperation, planning and action across government sectoral ministries and agencies, from finance to agriculture, from education to foreign affairs; regional government and woreda administrations; and outside government, by civil society, religious groups, the private sector, local communities, academic and research institutions, international and national NGOs and development partners. With so much complexity, and the need for involvement of so many different actors, the response needs strong strategic leadership. The EPA will fulfill this role and this vision is a step in communicating the Ethiopian government's approach to climate change and in strengthening cooperation amongst actors and stakeholders.

Policy and statutes guiding Ethiopia's climate response

National Environmental Policy of 1997

- Consistent with Article 44 of the Constitution all people have a fundamental right to an environment adequate for health and wellbeing
- The requirement to explicitly plan over 5, 10, 50 and 100 year timescales
- Federal to community level bodies identify and act upon issues through existing structures to integrate environment and development planning
- The conditions for formulating, reviewing and updating sectoral regulations on, and procedures for, the sustainable use of natural resources should be created
- A broad framework for incentives and punitive measures for sustainable resource management is to be developed; including assessment of the needs for and development of charging schemes for natural resource access, or subsidies and taxes and tax concessions, and the development of the capacity of government to use such financial mechanisms
- Community participation plays a central role in sustainable resource management and requires the formulation of environmental education campaigns to initiate, encourage and support the involvement of local community and religious leaders in programmes to promote environmental awareness and to motivate action.
- Requirement that federal, regional, and community strategic land use plans are in place which define broad land use categories and recommendations that can be used to guide natural resource management.
- The policy specifically covers soil husbandry; forestry; biodiversity; water resources; energy; minerals; human settlement; sanitation; industry and trade; cultural and natural heritage and atmospheric pollution and climate change. Within which it:

a. Promotes a climate monitoring programme
b. Recognises the need for control measures for green house gases and use of renewable energy
c. Calls for maximising standing biomass and the seeking of financial support from industrialised countries

Statutory objectives, powers and duties of the EPA relevant to the climate change response

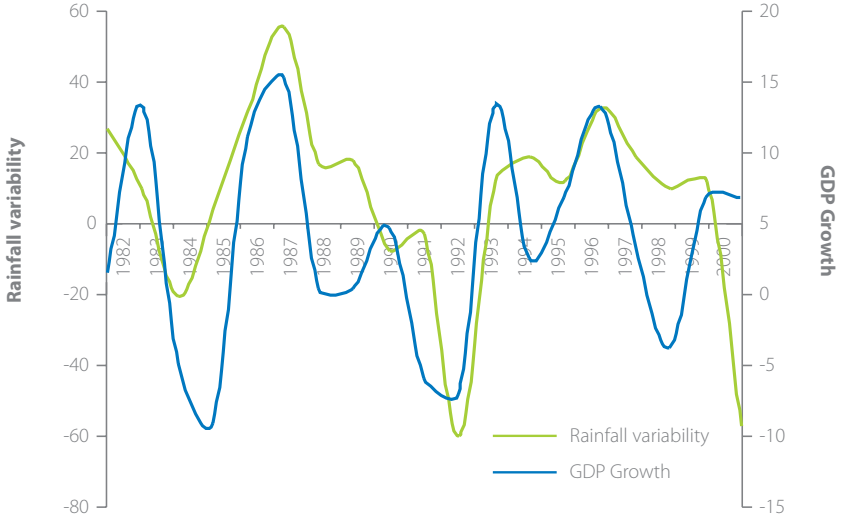
To formulate policies, strategies, laws and standards which foster social and economic development in a manner which ensures the welfare of humans, environmental sustainability and safety and to spearhead their effective implementation. EPA's duties and powers are as follows;

- Coordinate measures to ensure that the principles set out in the Environmental Policy are realized
- Prepare, review, update or propose new policy, strategy and law in consultation with competent agencies and the public, and monitor and enforce implementation
- Prepare a State of the Environment report for Ethiopia
- Devise incentive systems and support capacity development
- Cooperate to combat desertification and drought
- Take part in negotiations of international environmental agreements
- Advise on measures to cope with environmental emergencies
- Promote and co-ordinate research; advise government; support the regions; delegate powers; promote and provide education; and provide financial and technical support for management and protection of the environment

climate resilience

"in a worst case scenario, in 25 years time, Ethiopia will have only half the potential total GDP it could have attained and this will be because of the impacts of climate change"

Climate resilient economy



Climate resilience is the ability to cope with, and manage the change brought by weather stresses and shocks. A climate resilient economy is thus one which is protected against the negative impacts of extreme climate events, normally referred to as the weather, and climate change so that the well-being of the people and the economic growth and prospects of the country are not damaged by the impacts. Building a climate resilient economy is therefore about adapting effectively to climate change to minimize the potential damage and to maximize the potential benefits. Adaptation actions are required irrespective of a deal on global green house gas emissions. The greenhouse gases already emitted by the industrialised nations are already causing dangerous climate change and Ethiopia will need to adapt, or adjust to this change and continue adjusting since the climate is going to continue changing.

A recent study[3] by the World Bank projects that unless steps to build resilience are effective, climate change will reduce Ethiopia's GDP growth by between 0.5 and 2.5% each year.

As a worst case scenario, in 25 years time, Ethiopia will have only half the potential total GDP it could have attained and this will be because of the negative impacts of climate change.

Building resilience to avoid this damage to our economy depends on understanding the threats and the priority areas for focusing adaptation efforts.

Understanding the threats

Ethiopia's economy and social wellbeing are already exposed to climate variability and weather extremes. Agriculture, primarily rain-fed and highly sensitive to fluctuations in rainfall, forms the basis of the economy providing approximately 46% of GDP and jobs for 80% of the working population. Chronic food insecurity affects 10% of the population and even in average rainfall years these households cannot meet their food needs and they rely partly on food assistance. Droughts

3 World Bank 2008, Economics of Climate Change in Ethiopia

can result in sharp reductions in agricultural output and related productive activity and employment, with multiplier effects on the monetary economy. Floods regularly cause crop and infrastructure damage and widespread suffering and hardship, with, for example, several tens of thousands of people being displaced and over ten thousand hectares of cropland inundated in Afar and Amhara regions in 2010.

The close links between climate and Ethiopia's economy are reflected by the strong relationship between GDP growth rate and rainfall variability. Because Ethiopia's economy and the wellbeing of our people are closely linked to agriculture and the use of natural resources – water, land, forests, biodiversity and fisheries – adaptation and action towards climate resilience will come in part through focusing on improving performance and management in these areas with future climate change in mind. Ethiopia is also vulnerable to the health impacts of climate change, and to climate induced damage to transportation infrastructure. The implications of future climate change will be felt throughout these particularly vulnerable sectors, although secondary impacts will be felt more widely, for example in education and gender equity. The threats posed to the most vulnerable sectors are explored in more detail in the following paragraphs.

Agriculture

Agriculture is particularly sensitive to climate change. Greater total or more intense rainfall across Ethiopia may increase soil erosion and the incidences of crop damage. Ethiopia is particularly vulnerable to accelerated soil erosion because of existing pressures and degradation on our land area, 79% of which has a slope of greater than 16%, with 25% having a slope of greater than 30%. There will also be changes in production system viability; cropland area and cropping patterns; pest and disease frequency and distribution brought about by changes in seasonality; timing and distribution of rainfall; higher evapotranspiration; drought and flood damage.

Livestock yields will be impacted directly through temperature effects on annual growth, milk and wool production and reproduction; and indirectly by changes in the quantity and quality of pasture, forage, grass and disease and increases in parasites. Pastoralist communities may be particularly

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"Ethiopia's economy and the wellbeing of our people are closely linked to agriculture and the use of natural resources"

negatively impacted by climate change. The interactions between these problems and potential benefits of greater CO_2 'fertilisation' are largely unknown.

Transport

Although improvements have been made to Ethiopia's transport infrastructure and in 2008, the road network was 56,113km of which 85% was unpaved, a much greater transportation network is needed.

Improvement and maintenance of transport links between urban centres, to and from ports of export and import, and in particular to rural areas are a pre-requisite for economic development. However transport links, both paved and unpaved roads, are highly vulnerable to the increases in rainfall and temperature which are projected for Ethiopia, with heavy rainfall washing out roads and high temperatures damaging road surfaces.

A World Bank study[4] projects that climate change will increase the maintenance costs of the country's road network by between $10 million to $21 million, depending on the climate model used. These costs will be reduced and transport links maintained if road drainage and bridge designs are adapted to the expected climatic conditions. Maintenance costs of unpaved roads are also high and extending the network of paved roads is likely to be economically beneficial.

Industry

Ethiopia's economic development will require an expansion of industrial activities. Some of the industrial sectors, such as textile and leather, will allow us to increase our exports; others, such as cement and steel, will expand largely for domestic infrastructure development.

While the growth of our industrial sectors has the highest priority, we face a challenge related to GHG emissions caused by these activities. Ensuring the transfer of modern and resource efficient technologies is therefore an important component of our growth plans.

Energy

The vast majority of Ethiopia's national energy needs are derived from fuel wood, crop and animal waste and human and animal power. Only 5% comes from electricity and 95% of this is generated by hydro-power. Much of our hydro-power potential is yet to be developed. This energy mix greatly increases the country's vulnerability to climate change. For example, our reliance on fuel wood and charcoal brings widespread land degradation, exposing bare soil to erosive rainfall and gulley erosion. As climate impacts increase, there is likely to be a higher reliance on forest products for livelihoods.

Energy generated by hydropower is also vulnerable to fluctuations in rainfall, temperature and evaporation. For example, reduced power production during drought years already takes a significant toll on the economy. In 2002/3 power supply was lost one day a week over four months because of drought. This caused a sustained reduction in GDP generation. Loss of electricity also impacts on basic services especially in schools and hospitals.

Ethiopia plans to significantly increase its hydroelectric power production in order to supply our neighbours. Whilst these plans offer huge potential to power low carbon growth in Ethiopia and beyond, they need to carefully consider the implications of future climate change so that benefits can be sustained and conflicts with other water users avoided.

4 World Bank 2008, Economics of Climate Change in Ethiopia

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"Ethiopia's current energy mix greatly increases the country's vulnerability to climate change"

Health

The health impacts of climate change will be felt through six mechanisms:

- morbidity and mortality through temperature extremes;
- increases in vector borne diseases, such as malaria and bilharzia;
- increases in non-vector borne diseases related to weather conditions, for example diarrhoeal disease and cholera associated with both floods and drought;
- health problems associated with weather related air quality;
- injury and mortality through floods and storms;
- impacts of climate related influences on food and water supply, for example, malnutrition.

In a 2004 study (McMichael et al. 2004) it was calculated that 36,000 lives were already being lost each year across Eastern Africa (including Ethiopia) because of climate change. The same study calculates that the greatest future health risks associated with climate change in 2030 will be flooding, followed by malaria, diarrohoeal disease, malnutrition and cardiovascular diseases.

According to the World Health Organisation, 68% of Ethiopians are already living in areas at risk from malaria, where transmission is unstable and characterized by large scale epidemics. For example, in 2003 large scale epidemics resulted in 2 million confirmed cases and 3000 deaths.

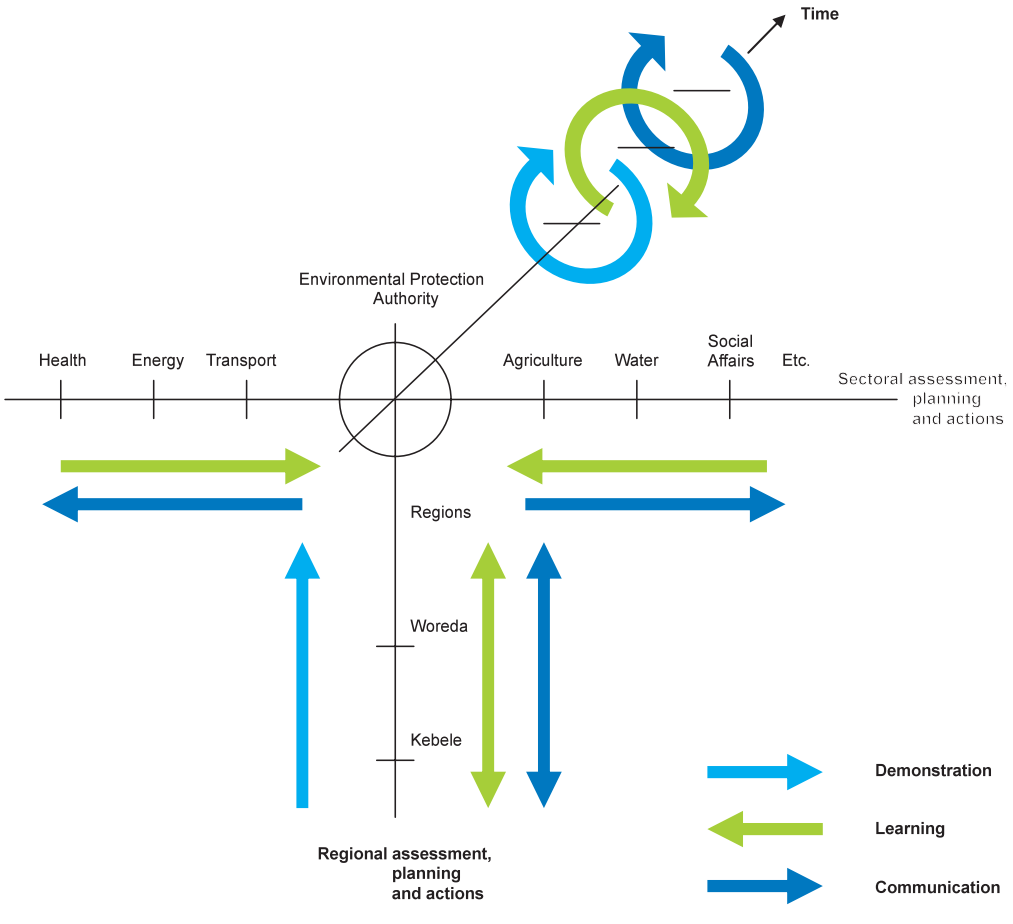
The 4th report of the IPCC states that by the 2050s malaria will have entered into the highland areas of Ethiopia and that by 2080 conditions will be highly suitable for malaria transmission.

Environmental resources

Water, soil, land, forests and biodiversity are the foundations of Ethiopia's economic development, food security and livelihood sustenance and each of them faces additional pressures through climate shocks and stresses. Climate change compounds a number of challenges facing natural resources management.

Effective adaptation to climate change and the construction of a Climate Resilient Green Economy will depend on improved management and use of our natural resource assets.

Adaptation through local community ownership



The areas of vulnerability listed above are considered to be significant for the country's future economic growth. The impacts of climate change reach across almost all aspects of social and economic activity. Climate resilience will therefore need to be embedded across Ethiopia's national development agenda. In particular, a key route to climate resilience is increased income and more diverse livelihoods; better healthcare and education; better access to technology and agricultural inputs; and greater social equity particularly for women, disabled people and marginalized groups. The successful implementation of the Growth and Transformation Plan is therefore dependent on action to build resilience, whilst greater resilience will also be a product of the benefits brought about by national economic and social development.

This far reaching nature and need for adaptation means that communities across Ethiopia need to take ownership and responsibility for appropriate action to build resilience. The EPA and our regional government partners are dedicated to supporting this local community owned adaptation and resilience to climate change. These aspirations will be delivered through a national adaptation programme.

Ethiopia's Programme of Adaptation to Climate Change

Ethiopia's Programme of Adaptation to Climate Change (EPACC) is a programme of action to build a climate resilient economy through adaptation at sectoral, regional and local community levels. The EPACC updates and replaces Ethiopia's National Adaptation Programme of Action (NAPA) which was formulated in 2007 and submitted it to the UNFCCC Secretariat. The May 2010 report of the UNFCCC's Least Developed Countries Expert Group encouraged the updating of NAPAs, suggesting that a more programmatic approach could be more effective than the project approach of the NAPAs. In line with this suggestion, Ethiopia has reformulated its adaptation programme. Ethiopia's NAPA contained detailed descriptions of some larger adaptation projects, but the formulation of those projects was not as ambitiously participatory as that of the present EPACC. Nevertheless, the contents of the first version of Ethiopia's NAPA have helped in developing the present EPACC. The EPACC includes 29 components (see annex) reflecting the 29 objectives presented in the table on page 16.

To contribute to the elimination of poverty and to lay the foundation for a climate resilient path towards sustainable development.

1. Involve the whole population in planning and implementation of adaptation to climate change.
2. Forcast climate change through country-level and sub-country level climate change modeling.
3. Identify and prevent worsening and emerging human diseases.
4. Identify and prevent worsening and emerging animal diseases.
5. Identify and prevent worsening and emerging crop and wildland plant diseases and pests.
6. Prevent land degradation and thus reduce soil loss to its natural equilibrium rate of equaling the rate of soil formation from bedrock.
7. Reduce biodiversity loss to achieve an equilibrium with the natural rate of diversification.
8. Prevent biomass and soil nutrient accumulation in urban areas as waste by taking the waste back to farmlands as fertilizer.
9. Counter the agricultural productivity reduction that emanates from climate change through effective research and development.
10. Manage water effectively to make it always available to humans, animals and crops.

Objectives of EPACC

11 Reduce the impacts of severe droughts by cloud seeding to induce rain.

12 Establish building & construction codes that ensure structures withstand extreme weather events.

13 Store food and feed in good years for use in bad years.

14 Ensure that transportation access to disaster prone areas is always available.

15 Develop an insurance scheme for compensation from damage from bad weather.

16 Organize and train local communities for quick response to extreme weather events.

17 Resettle people from disaster prone areas before disasters materialize.

18 Shift homesteads to using renewable resources of energy.

19 Shift from fossil fuel to renewable energy for running engines for transportation and other purposes.

20 Ensure that gender equity is achieved.

21 Ensure that the physically handicapped are enabled to fend for themselves.

22 Prepare to receive and cater for environmental refugees driven away by climate change.

23 Map and delineate areas likely to suffer from climate change and extreme weather events.

24 Develop an accessible information network on climate change.

25 Develop an early warning system to alert people of impending extreme weather events.

26 Mainstream awareness on climate change into development and service activities.

27 Mainstream adaptation to climate change into education curricula.

28 Ensure that research and development efforts in all sectors focus on adaptation to climate change.

29 Establish an effective monitoring and evaluation system for the Implementation of the Programme of Adaptation to Climate Change.

The programme of implementation has been based on an open-ended iterative, participatory process which will work primarily across three dimensions, horizontally across sectors, vertically from federal level down to local communities and back up to the federal level, and through time, to gather and disseminate the learning developed to deepen benefits and widen coverage. As shown in the diagram on page 15, the programme will reach from the federal level through all levels of administration down to sample local communities in each regional state. Each local community will formulate its own work programmes and by-laws to guide and govern the actions of its members towards greater climate resilience. From an initial sample focus of 64 woredas (12% of the total) the lessons learnt will be gradually scaled up to the whole country.

The second dimension of EPACC is to reach throughout government sectors to ensure that the mainstreaming of climate change is embedded within government policies and plans through Sectoral Climate Programmes and Action Plans. Following a national workshop called by the EPA which provided advice on formulation and content, Sectoral and Regional Programmes of Adaptation to Climate Change have been produced (see example of the Health Sector Adaptation Programme). The programmes need to be formulated to a high standard to stand the best chance of receiving funding and stakeholder support and the EPA with development partners will assist and help build the capacities required for their continuing relevance.

In both the planning and implementation of EPACC all levels of government administration, all types of civil society, religious organisation and local communities across the country are invited to participate. Not only will this ensure an equitable and balanced response to climate change for social justice, but it will also assist in generating appropriate knowledge, skills and actions, and thus the effectiveness of the programme.

The programme will be regularly monitored and reported on and verified. The monitoring of the programme will not only contribute to continual improvement and efficacy, but it will generate learning from demonstration activities in sectors, regions and communities which will be communicated and scaled up to inform and benefit others.

An initial programme for the first three year phase of the EPACC (2011-14) has been budgeted at US$10 million and will receive significant support from the Government of Japan through the United Nations Development Programme (US$ 6.5 million) with a further US$ 2.6 million from the United Nations Development Programme. Negotiations are almost complete with the European Union to provide €13.7 million for implementing the EPACC. The World Bank and others are supporting this work through studies on the Economics of Adaptation to Climate Change in Ethiopia. DFID's £15 million Strategic Climate Institutions Programme, while not directly supporting EPACC, will complement its activities.

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"effective adaptation to climate change and the construction of CRGE will depend on improved management and use of our natural resource assets"

Health Sector Programme of Adaptation to Climate Change

Health Sector Programme of Adaptation to Climate Change

Climate Risks: Vector borne and diarrhoeal disease identified as key risks. Challenges to dealing with these risks: (1) low awareness and inadequate advocacy (2) weak partnerships in relation to climate change (3) quality and availability of information on vulnerable areas (4) capacity and functional gaps in current systems e.g. responses to emergencies and extreme weather events (5) weak surveillance systems (6) limited capacity amongst health staff and lack of equipment

Objectives: Adapt to the impacts of climate change by strengthening health systems to enable a response to climate related health risks (1) advocate for political attention to the issues (2) raise awareness of risks and coping mechanisms for behaviour change and social support (3) strengthen preparedness, early warning systems and response capability of local health services and the Public Health Emergency Management in the Ministry of Health (4) undertake a national assessment of vulnerability to climate related health risks

Programme summary: (1) Nationwide implementation of health extension programme with an emphasis on preventative health care at the household level (2) deployment of 33 000 health care workers to more than 15000 kebeles (3) risk-based selection of woredas based on prevalence and recurrence of vector borne and diarrhoeal disease (4) emphasize the needs of women, the marginalized, the disabled, elderly and children (5) link the handling of climate health risks to attainment of the MDGs and health equity

1 Plan action from national to kebele level
2 Awareness raising campaign
3 Advocacy workshop to put health at the centre of adaptation

Activities planned:

4 Provide Information Education Communication (IEC) / Behaviour Change Communication (BCC) tools
5 Develop Health Extension Worker (HEW) capacity and health service provision eg. for diag-multi species rapid diagnostic testing equipment
6 Indoor air pollution – actions to improve ventilation
7 Ambient air pollution
8 Sanitary landfill provision
9 Liquid waste management and proper drainage installation
10 Public Health Early warning systems
11 Interaction with other parties
12 Joint sectoral activities
13 Identification of most effective actions

Estimated costs / funds needed:

US$1.5 Million for initial 6 month phase

climate resilience

"Under a carbon neutral growth trajectory, Ethiopia could offset in the region of 320 million tonnes of carbon a year. Even with the low current carbon price of US$10-20 per tonne, that could generate billions of dollars for the country."

Why should Ethiopia plan for a low carbon future?

Although climate change poses significant threats, the international response to climate change also offers considerable opportunities for Ethiopia. Within the broader global agenda on climate change, poor countries like Ethiopia stand to gain from both adaptation and carbon finance. Carbon finance - payments for activities which reduce global carbon emissions such as planting new forests and foregoing dirty technologies – has the potential to be a major revenue source for Ethiopia. Although it is an early estimate and needs to be refined and assessed for feasibility, and it will require changes in the way carbon finance is transacted, it has been calculated that under a carbon neutral growth trajectory, Ethiopia could offset in the region of 250 million tonnes of carbon a year. Even with the low current carbon price of US$10-20 per tonne, that could generate billions of dollars for the country.

The opportunity is not just financial. Climate change offers a lens through which Ethiopia can revisit some of its most intractable problems. The challenge we face is to position Ethiopia at the forefront of the low carbon revolution promised by the climate agenda. Ethiopia has huge low carbon potential – it is rich in forests and has ample renewable resources of hydro, solar, wind and geothermal energy. To make the most of this potential, the country will need to (1) ensure that its long-term planning is compatible with a low carbon future and (2) make itself as attractive as possible to carbon investors.

The disadvantages of following a 'traditional' high carbon growth path and the advantages of taking a low carbon 'green growth' path for Ethiopia have been summarised in the table on page 22.

The case for developing a carbon neutral economy is a convincing one for Ethiopia. It has the natural resource assets which will help generate all the clean energy it needs and to decouple the economy from the wildly fluctuating prices and unsustainable nature of the oil based global economy. Global carbon finance will play an increasingly important role in the global economy and one that Ethiopia can benefit from. The co-benefits for health, overall wellbeing, economic growth and natural resource conservation are significant – for example clean energy reduces local pollution and forest conservation maintains watershed functions and reduces soil loss; and Ethiopia is well positioned to become a regional and global leader in low carbon growth which will have legacy and commercial benefit long into the future.

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"Ethiopia is well positioned to become a regional and global leader in low carbon growth which will have legacy and commercial benefit long into the future"

	Traditional Growth	Low carbon or green growth
	Likely outcomes if Ethiopia follows a 'traditional' growth path:	**Likely outcomes if Ethiopia follows a low carbon, 'green' growth path:**
Energy	Dependence on imported fossil fuels High emissions Power shortages and restricted coverage	Sufficient renewable energy resources to support economic development Exporter of clean energy regionally Expansion of rural energy coverage
Agriculture (including livestock)	Reduction in soil fertility Lower yields Vulnerability to floods and droughts and increasing food insecurity	Long term land use and fertility maintained Higher yields Food security
Industry	High dependency on carbon-intensive materials Expensive infrastructure intensive solutions	Greater emphasis on sustainable materials or productive pathways Smart manufacturing allows for increased efficiencies
Forestry	1.5 million hectares of forest and shrub cover at risk due to agriculture expansion and biomass energy needs Health issues through smoke inhalation	Zero deforestation and sustainable forest use Reforestation and afforestation as carbon sink Healthier sources of cooking and heating energy Watershed services maintained – fewer floods and droughts, erosion control
Transport	Congested cities Dependence on expensive imported diesel and petrol Polluting, aging, unsafe vehicle stock	Increased availability of clean transport – rail, electrical vehicles, use of biofuels. Reduced oil dependence Healthier, cheaper, safer transport
Settlements	Unplanned development Unsanity, unmanaged waste Low quality of life and reduced wellbeing Poor health	Coordinated and rational long term planning of settlements Healthier towns and cities providing higher quality of life and wellbeing
Economy Wide	Dependent on commodities and international price fluctuations including oil price	Macroeconomic conditions bring job and wealth creation and reduce poverty Increased exports, reduced imports

crgevision

"Ethiopia's historical contribution to greenhouse gas emissions on a global scale has been negligible and the country will not be forced to prejudice future growth and wellbeing by restricting emissions "

What does mitigation mean for Ethiopia?

A country which does not produce a net addition to atmospheric greenhouse gases has a carbon neutral economy. A carbon neutral economy is about taking opportunities to mitigate, or reduce green house gas emissions. The objective is to reduce, offset or sequester (capture in plants, trees and soil) the amount of green house gases in the atmosphere in order to prevent future climate change. The main gases include carbon dioxide, methane, nitrous oxides, chlorofluorocarbons (CFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). The main sources of greenhouse gases due to human activity are:

- Burning of fossil fuels and deforestation leading to higher carbon dioxide concentrations. Land use change (mainly deforestation) accounts for up to one third of total anthropogenic CO2 emissions.
- Livestock enteric fermentation and manure management, paddy rice farming, land use and wetland changes, pipeline losses, and waste landfill emissions leading to higher methane atmospheric concentrations.
- Use of chlorofluorocarbons (CFCs) in refrigeration systems, and use of CFCs and halons in fire suppression systems and manufacturing processes.
- Agricultural activities, including atmospheric pollution from fossil fuels through the use of chemical fertilizers, that also lead to higher nitrous oxide (N2O) concentrations in the atmosphere.

Ethiopia's historical contribution to greenhouse gas emissions on a global scale has been negligible and the country will not be forced to prejudice future growth and wellbeing by restricting emissions of green house gases. However, as we have already explored, it stands to benefit from mitigation actions for carbon offsets.

NAMAs

To begin this work, in line with commitments within the Copenhagen Accord, the EPA, on behalf of the Federal Democratic Republic of Ethiopia, compiled from various sectors and submitted the country's voluntary Nationally

Appropriate Mitigation Actions to the Executive Secretary of the UNFCCC in January 2010. The NAMAs contain aspirational targets for actions across the sectors to mitigate climate change which, under commitments made within the Copenhagen Accord, should be afforded financial and technological assistance from industrialised nations. A summary of the NAMAs is provided in the table on Page 25.

The EPA wants to help Ethiopia access significant funds from the 'Fast Start Finance' committed under the Copenhagen Accord. Starting in 2011. These funds could help to enable the transfer of technology and capacity building required to fully achieve the targets articulated under the CRGE. Activities currently underway are:

- Greenhouse gas inventories and emission projections
- Emission reductions in tons of carbon dioxide equivalent relative to baseline
- Information and analysis on mitigation action options and estimate of benefits
- Estimate of costs and incremental costs
- Indication of type and level of support required and description of actions for which support is sought.
- Design and scoping to establish a Climate Innovation Centre in Ethiopia to incubate private sector businesses working in the low carbon sector.

In addition, new emissions abatement initiatives beyond the scope of the NAMAs are currently considered in the industry, forestry, soil, livestock, power, transport and rural construction sectors.

Green growth plan

We have been working with the Global Green Growth Institute (GGGI) to use our emissions abatement initiatives (e.g. NAMAs) towards building a green economy. Through this work, we now have a better understanding of the opportunities and challenges in the key sectors of agriculture, forestry and energy.

The study identifies water management as being key to achieving a green economy. The availability and efficient use of water will be critical in developing hydropower and agriculture. The study also identifies forest resources as both economically and environmentally critical. It advocates controlling the rate of deforestation by reducing the need for fuel wood. The study also proposes active reforestration and improved forest management. In the area of agriculture, the study suggests that farmland productivity can be boosted through agricultural intensification. Similarly, livestock productivity can be increased by introducing modern practices. Finally, in the energy sector, the study identifies investment as a major challenge. .

We will use these recommendations to help shape Ethiopia's long-term trajectory towards a green economy. To do this, the Environmental Protection Authority will continue to work closely with development partners.

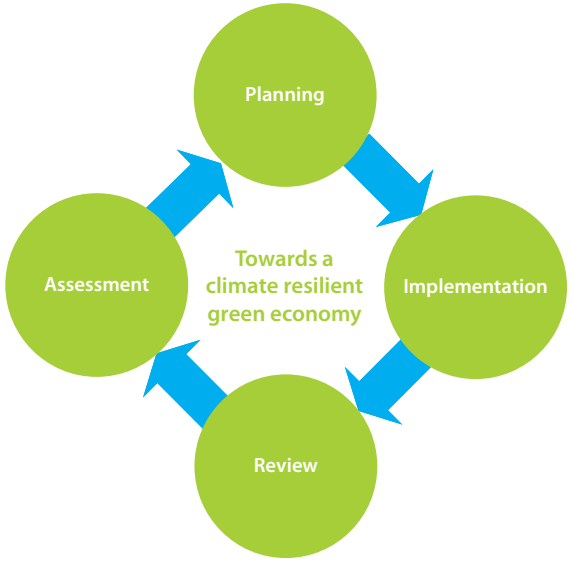
Summary of the Nationally Appropriate Mitigatory Actions (NAMAs)

1. **Electricity generation from renewable energy for the grid system**
   - *Hydropower.* Ten hydropower generation facilities to be completed with 5632 MW electric power generation capacity by 2015
   - *Hydropower projects under study.* Hydroelectric power generation studies to be completed with potential of 8915 MW capacity
   - *Wind power projects.* Seven wind power projects, with a total of 762 MW electric power generation capacity; to be completed by 2013
   - *Geothermal power projects.* Six geothermal power projects with a total of 450 MW electric power generation capacity; to be completed in 2018
2. **Bio-fuel development for road transport and for household use** (to produce ethanol & biodiesel)
3. **Electricity generation from renewable energy for off-grid use and direct use of renewable energy**

   Solar home systems, small hydro electric power generation facilities, wind pumps, solar pumps, institutional photovoltaics, solar lanterns, solar water heaters, solar cookers, improved biomass household stoves, biodiesel stoves, household biogas, institutional biogas plants.
4. **Railway projects with trains to run with electricity generated from renewable energy**
   - National routes
   - Addis Ababa Light Rail Transit project 300 km, to be completed in 2020
5. **Forestry/forests**
   - Enhanced district level reforestation actions for the increment of vegetation cover of degraded lands, lands affected by gullies and slopes including through the management of community areas closed off to grazing
   - Natural high forest area sustainably managed in order to reduce GHG emissions from deforestation and forest degradation
   - Deciduous forest land sustainably managed in order to reduce GHG emissions from deforestation and forest degradation
   - National parks sustainably managed to reduce GHG emissions from deforestation and forest degradation
   - Existing forests that are providing non-timber forest products maintained as buffer areas for mitigating desertification
   - Forest in exhaustion or production forests established and sustainably managed for the purpose of sequestering carbon
   - Wetlands wisely managed and sustainably used
6. **Agriculture**
   - Application of compost to agricultural land for improved fertility of, and increased carbon retention by, soil
   - Implementation of agroforestry practices for livelihood improvement and carbon sequestration
7. **Waste management**
   - Nine projects to reduce the generation of methane from deposited urban solid and liquid waste

making it happen

"Faststart funds could help to enable the transfer of technology and capacity building required to fully achieve Ethiopia's targets"



Achieving a climate resilient green economy (CRGE) is an intergenerational challenge. This vision not only sets out our aspirations on climate change, but also identifies key components for moving forward. In some ways this chapter raises many more questions than it answers. Nevertheless, we believe that it provides a useful starting point for co-ordinating Ethiopia's efforts to build a climate resilient green economy.

Our approach

To build a truly climate resilient green economy, we will need to be flexible and innovative. We will need to learn from our mistakes and refine our approach based on emerging evidence and thinking. To do this, we have developed an iterative model for thinking about climate change. This model, outlined in the diagram, will help us constantly challenge and refine the components required to achieve a climate resilient green economy. The key steps are as follows;

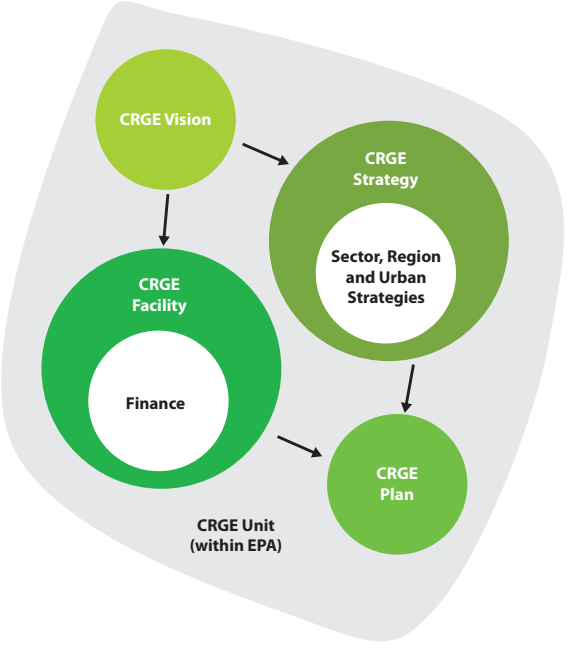
1. **Planning**. Strategic and operational planning including stakeholder consultation, mainstreaming climate resilience, identifying actions (programmes, policies etc.), stakeholder consultation and costing.
2. **Implementation**. Activities and actions to counter climate change. For this to happen we will need financing, capacity building, and technology transfer.
3. **Review**. Using monitoring and evaluation systems, we will track and report on our progress. Verification systems will also be needed to meet international obligations.
4. **Assessment**. Our progress will also need periodic assessment, whereby we look at the enabling environment, roles and responsibilities. This work will need to be supported by piloting/demonstration along with research and analysis. Most important, the assessment of our progress towards a climate resilient green economy will need to be done through dialogue with all stakeholders, not least the public.

Our institutions

To co-ordinate a response on climate change, we have already put in place some new institutional arrangements. As previously explained, the Environmental Protection Authority is the co-ordinating agency on Ethiopia's climate response. To facilitate cross-government engagement on this agenda, the Ethiopian Government has recently established a new CRGE ministerial committee. This committee is supported by a technical working group, itself delegated into a series of sub-sectoral working groups (see diagram on page 27). These ad-hoc institutional arrangements will be replaced by permanent institutional arrangements to direct Ethiopia's efforts to achieve a climate resilient green economy.

In addition to these arrangements, EPA will also conduct political economy analysis to identify the economic benefits and costs to particular constituencies and assess the political, administrative and institutional feasibility of proposed measures. This analysis will help develop solutions to mitigate any negative impacts of CRGE. This analysis will need to be done in the context of Ethiopia's decentralised model of government. Lastly, the analysis should help examine if there is a need to further strengthen the co-ordination mechanisms identified above.

Components



There are four key components on the road to achieving a climate resilient green economy. The components will need to be developed in parallel rather than one after another. The first is to develop a **CRGE Strategy**. This will identify immediate spending priorities and financing opportunities. The second component is to establish a **CRGE Facility** to support the implemention of the Plan. The third component is to establish a **CRGE Unit** in EPA to take forward strategic planning relating to climate change. And the fourth is to bind together the priorities identified in the CRGE Strategy with the institutional architecture emerging from the CRGE Facility to produce a detailed **CRGE Plan**.

CRGE Strategy

The CRGE Strategy will elaborate on the priorities for Ethiopia on climate change, building on those identified in Ethiopia's Programme of Adaptation to Climate Change and the current emission abatement initiatives (e.g. NAMAs). The strategy will provide a blueprint for Ethiopia's response to climate change and an overarching plan to realise the ambition to build a climate resilient green economy.

Sectoral, regional and urban strategies

The core of the CRGE Strategy will be made up of a set of sectoral climate change strategies. These will detail the specifics of Ethiopia's climate change response. These sectoral strategies will be based on a systematic assessment of the implications of actions on climate change – both on resilience and on green growth – for specific sectors. The drafting of sectoral climate change strategies (SCCSs) should be led by the sub-technical committees, with support from the relevant line ministry and the Environmental Protection Authority.

Following the SCCSs, the drafting of regional climate change strategies (RCCSs) should be led by the relevant regional government. Finally, the drafting of urban climate change strategies (UCCSs) should be led by the three city administrations (Addis Ababa, Dire Dawa and Harar).

All components will be developed through a consultative process with key stakeholders. EPA will ensure that these strategies are aligned with the CRGE Vision. EPA will also be responsible for harmonising across regional and sectoral action plans to ensure that they are mutually compatible. The drafting process will be designed to enable maximum ownership amongst stakeholders and, if necessary, the commissioning of additional evidence and analysis.

CRGE Facility

The second component is a CRGE Facility. The Facility will be a national institution, working with all stakeholders to support Ethiopia's climate change response. It will be closely linked to the Environmental Protection Authority, the Prime Minister's Office and the Ministry of Finance and Economic Development. The core purpose of the CRGE Facility will be to channel finance to the activities prioritised in the CRGE Strategy and later, the CRGE Plan. The intention is to establish the CRGE Facility by the end of 2011.

The CRGE Facility will be responsible for attracting, allocating and channelling international climate finance. The Facility will look to leverage both public and private finance, from both multilateral and bilateral sources. Finance will flow towards activities which have been identified in the CRGE Strategy and CRGE Plan. Ideally, climate finance will complement other forms of investment to bolster Ethiopia's core climate-compatible development activities (in areas such as food security, energy, infrastructure development and natural resources management). We are also looking at the possibility of having a results-based / performance-based mechanism for allocating finance.

At least initially, the CRGE Facility's fiduciary risk and financial management functions will be provided by UNDP. However, the medium-term objective will be to handover these responsibilities to a permanent national institution.

The CRGE Facility will administer a multidonor trust fund (MDTF). To maximise aid effectiveness, and facilitate a shift from a project to a programme approach, it is hoped that Ethiopia's development partners will increasingly channel their bilateral climate funds through the MDTF.

CRGE Unit

To ensure that Ethiopia's approach to climate change is responsive to evolving needs and events, the Environmental Protection Authority will continue to perform a strategic planning role on climate change.

EPA will establish a dedicated CRGE Unit. The

Unit will be a virtual body, operating through the existing teams and departments of the EPA. The Unit will work with all stakeholders, to identify the priorities for climate activities, including identifying research gaps and supporting the refining of climate action plans. The CRGE Unit will draw on capacity from across the Ethiopian Government.

In the short-term, the CRGE Unit will draw on the expertise and capacity of key development partners. In the medium-term, however, the CRGE Unit will build up both its own capacity and capacity within other government departments.

The CRGE Unit will also be responsible for monitoring our progress towards a climate resilient green economy. The Unit will help to establish both the monitoring and evaluation framework for tracking national progress.

Furthermore, it will establish internal capacity for the measuring, reporting and verification systems required by the United Nations Framework Convention on Climate Change, so as to enhance Ethiopia's chances of meeting standards for international verification. These systems will need to use indicators which are compatible with globally agreed definitions of adaptation and mitigation. Strengthening the MRV arrangements on climate change will not only help us co-ordinate our response to climate change but will also help us access climate finance.

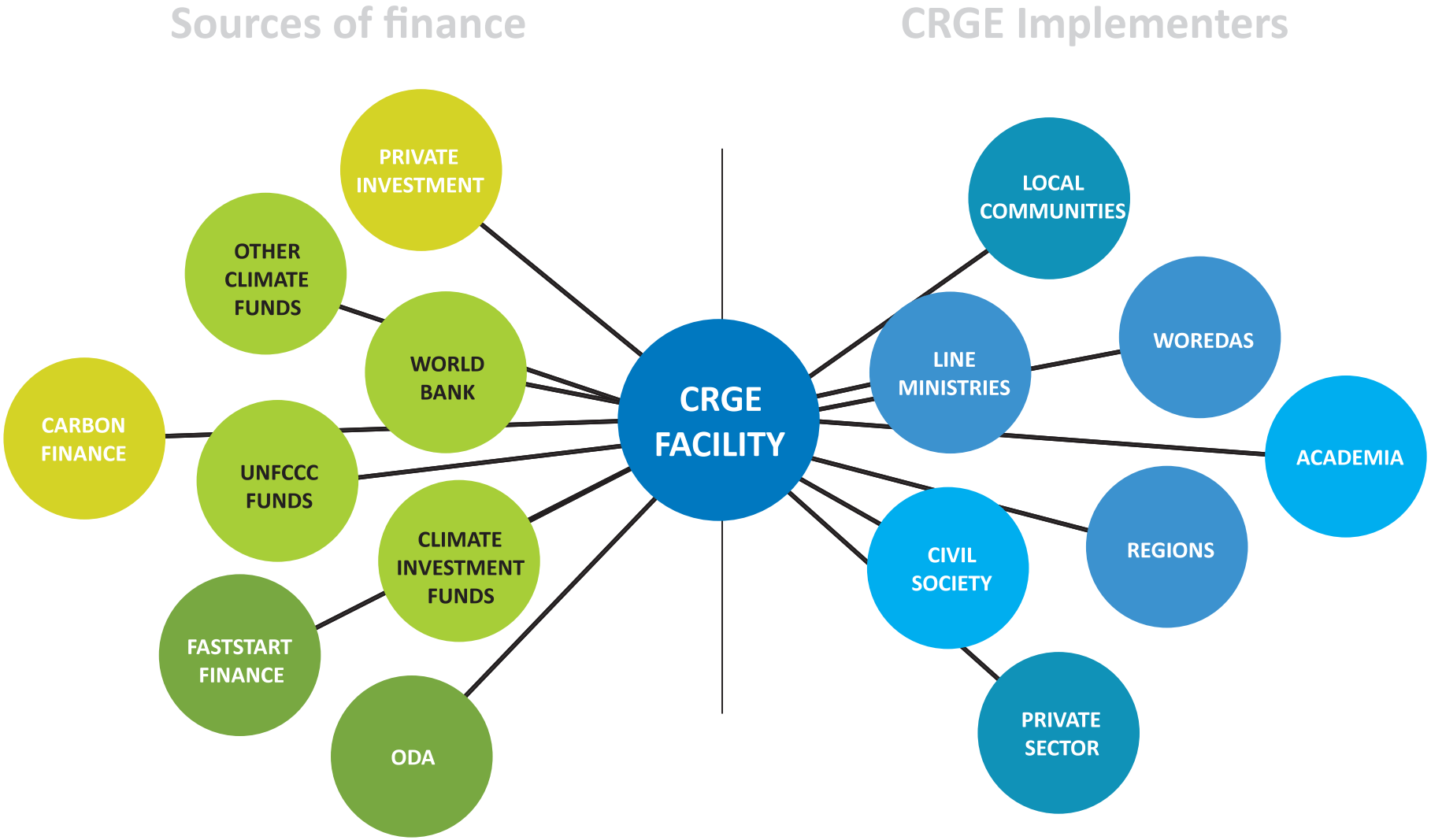
The development of a basket of indicators will be done in partnership with the Central Statistics Agency and the Environmental Protection Authority. This work may identify the need to strengthen data collection and management systems.

CRGE Plan

Finally, the CRGE Unit will lead the development of a comprehensive CRGE Plan. This document will bind together the institutional and strategic arrangements already spelt out in this vision, the CRGE Facility and the CRGE Strategy and will provide a detailed implementation plan.

The CRGE Plan will further detail the sectoral, regional and urban priorities for responding to climate change by refining the action plans contained within the CRGE Strategy. In addition to this, the CRGE Plan will also capture the institutional, monitoring and finance arrangements being developed with the support of the CRGE Facility.

The CRGE Plan will be the guiding document for Ethiopia's activities on climate change. The Plan will have a ten year horizon and we aim to complete the document by the end of 2012. We recognise that developing this strategy in a relatively short space of time will be a huge challenge. To help us do this, we will need the support of all our partners, from the private sector, civil society and the development community.


Sources of finance
CRGE Implementers
PRIVATE INVESTMENT
OTHER CLIMATE FUNDS
WORLD BANK
CARBON FINANCE
UNFCCC FUNDS
CLIMATE INVESTMENT FUNDS
FASTSTART FINANCE
ODA
CRGE FACILITY
LOCAL COMMUNITIES
LINE MINISTRIES
WOREDAS
ACADEMIA
CIVIL SOCIETY
REGIONS
PRIVATE SECTOR

crge

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